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AN
A C C O U N T
OF THE
CULTURE AND USE
OF THE
MANGEL WURZEL,
OR
ROOT OF SCARCITY.

TRANSLATED FROM THE FRENCH
OF
THE ABBÉ DE COMMERELL,
CORRESPONDING MEMBER OF THE ROYAL SOCIETY
OF ARTS AND SCIENCES AT METZ.

THE SECOND EDITION.



L O N D O N :

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ADVERTISEMENT.

IN the midsummer of 1786, a few seeds were given me, said to be those of a dietetic vegetable, known in France under the name of the *Racine de Disette* *. As I was then ignorant of its cultivation and qualities, I planted the seeds in light earth, which was then placed in my hot-house. They vegetated in about a week, and in the space of two months had acquired stalks of the thickness of a goose-quill, when they were transplanted into the open air.

* The late Sir Richard Jebb, was, I believe, the first person in England in possession of these seeds; some of which were presented to the Society of Arts, and by the Secretary to some of the members, among whom I was included.

Although this was in September, they continued to increase rapidly, and preserved their verdure throughout the winter. In this season I plucked off some of the leaves, and had them boiled for the table; they were of a fine green colour, lighter than spinach, and something like it in taste, with a flavour somewhat resembling that of asparagus.

At this period, I took up three roots, each about four ounces in weight, which, after boiling, eat very much like parsnips, and the roots had the same shape.

So much I had experienced of the cultivation and use of this vegetable, when the following account of it fell into my hands; a translation of which I immediately procured, and now publish, in order to diffuse the knowledge of so beneficial an article of diet.

Though this country does not spontaneously produce any great variety of vegetables proper for the table, yet by the introduction of
foreign

foreign products, and the arts of culture, it nourishes in its bosom, at this time, the greatest and most useful varieties of fruits, and other dietetic vegetables, in the world. I conceive, however, that every additional article of nourishment, especially like this almost incredibly abundant, and at the same time salutary both to the human and brute species, must, like the Potatoe which Raleigh brought from America, prove an interesting acquisition to the public. I calculate, from the product of my garden, that a square yard of ground, planted with the Mangel Wurzel, will yield FIFTY POUNDS in weight of salutary food ; an abundance equalled by few, if any other plants hitherto cultivated in Europe.

The last winter was unusually mild ; during the whole of which, this vegetable retained its verdure, as has been already observed : and as it has never experienced any other winter here, I cannot determine what effect a severe season might produce. I remarked, that the new shoots augmented by plucking the leaves of a preceding growth ;

and that even the stalks that shot into flower in June 1787, and were accidentally broken off, were replaced by fresh stalks and flowers in the succeeding month; less strong, indeed, but more numerous.

As I have lately procured some seeds from the continent, I shall pay further attention to the cultivation of this vegetable; and hope to add its botanical history, and an accurate engraving of it, coloured from nature.

JOHN COAKLEY LETTSOM.

London, Aug. 1, 1787.

THE



T H E
P R E F A C E
T O T H E
S E C O N D E D I T I O N .

TH E demand for the first edition of the following performance has been so great, as to call almost immediately for a second; which has prevented me from accomplishing, as I had proposed, a coloured plate of the Mangel Wurzel, with a botanical description of the plant. An engraving of it is now under the artist's hand, but it cannot be completed early enough to accompany the present impression.

As the attention of the publick to the culture of this plant appears to have been

much excited, I was unwilling by deferring the republication of this account, to disappoint the laudable curiosity of the lovers of horticulture. The delay of the proposed description will not be productive of much inconvenience as the plants which have been raised from seed since Midsummer, of which about three thousand have been disposed of, cannot go into flower before next year, and prior to that period, I shall not only have completed the botanical account of the Mangel Wurzel, but shall have perhaps acquired also additional experience in the culture of it, and of some other culinary vegetables, whose history, I hope, will accompany it.

The plants thus dispersed will, however, be attended with the advantages of affording leaves for the use of the table during the autumn and winter, and will afterwards run into seed in the ensuing summer. The quantity of seed produced from one root will nearly suffice to cover half an acre of ground with the Mangel Wurzel: so that in a very few years it will be common throughout Europe, America, and the West-Indies, if
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the seeds and plants prosper, which I have distributed and sent abroad.*

Since the first edition of this translation was printed, I have seen the Mangel Wurzel in flower, and am convinced that it is a species of beet, of which there are several cultivated in this country, particularly the white, green, red, yellow, and great white Swiss beet,† the last of which it nearly resembles.

This affinity, however, does not detract from the value of the Mangel Wurzel, every part of which is edible and salutary ; and besides allowing nutritious fodder for cattle, affords a supply for the table, both in summer and winter, as has been observed. The leaves exceed spinach, and the roots those of parsnips. The stalks and ribs of the large leaves, divested of the leafy part, and peeled, eat like asparagus ; or may be used in soups, which they greatly

* It may be observed that many of these plants, having been injured in their tap-roots, by transplanting, will not afford a fair specimen of the immense growth which the roots of this vegetable acquire.

† The Cicla of Miller ; and Chard, or Swiss Beet of Abercrombie.

improve.

improve. The leaves tied up in a bag or net, with slices of meat interlaid, and boiled, make a dish both pleasant and salutary; or with plumbs, damsons, sliced apples, quinces, &c. afford a diet that is highly esteemed by many.

I plead excuse of the reader for these culinary digressions, but these minutiae are necessary in the description of a plant which promises to furnish an agreeable variety to the tables of the opulent, and, which is of infinitely more importance, to provide the poor with food both cheap and wholesome.

These considerations, and a persuasion of the abundant produce of the Root of Scarcity, induced me to encourage its cultivation, by disposing of the plants to persons in the possession of gardens. At first I was able to part with several of them to each individual who applied; but at length I am reduced to the necessity of appearing a niggard, as the numerous demands have nearly cleared my garden of them; but I have sent to Paris for a large supply of seeds, which I shall divide, as soon as they arrive, with those of my own, now
nearly

nearly fit to gather, into small parcels, for the purpose of giving away to such persons as have already had some plants, and to as many more as please to apply, till the feedsmen in London procure them for sale. There may be individuals averse to accept them gratuitously, or who, from a fear of giving trouble, may be deterred from making application ; but as they cannot yet be purchased here, these objections should not be admitted in opposition to designs of public utility. Indeed by such applications they rather confer an obligation on the donor : for I am persuaded that the culture of this plant will prove a national benefit ; in contributing to which I feel a sincere pleasure, and have therefore a selfish wish to extend on every hand, the cultivation of the Root of Scarcity.

How many families surround the metropolis, in possession of little gardens, often abounding in weeds ; who, with less trouble than is necessary to clear them away, might dine once a week* upon this salutary vegeable !

* Thirty seeds produce upon an average about one hundred plants, which may afford a salutary vegetable for the table of a small family, three days in the week during the whole year.

How

How many are there, with a little tract of land, scarcely sufficient to feed the cow, which is to supply the family with milk, might compensate the deficiency of a dry summer, by covering a part of the land with the Root of Scarcity !

How many persons in affluence, by devoting a space of ground to raise this prolific vegetable, might supply their poor neighbours, in hard winters, with its roots and leaves, which seasoned with a morsel of meat, would afford a pleasant and plentiful nourishment.

All these, as long as I possess seeds, may be immediately supplied, upon application, with a portion of them.

JOHN COAKLEY LETTSOM.

London, Sept. 5. 1787.

INTRO-



INTRODUCTION.

AS I am fully convinced, that a great population is the surest indication of the happiness of a nation, and the most certain presage of its glory; and as I also know, that population cannot be advanced, or even continued in its present state, but in those countries in which the necessaries of life are to be obtained in plenty; I have thought it my duty to make a root generally known, which, in years of scarcity, will afford to men an healthful and agreeable food; which, when fodder is scarce or dear, will furnish cattle, as well during the summer as the winter, with a cheap and abundant nourishment; which, at all times, and in all countries, may be certainly produced in great quantities; and of which the cultivation is simple, and the crop gathered in with little trouble, and which is easily preserved.

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The root, of which I have undertaken to give an account, is not known in France, or at least very little. It has no proper name in French, and I have not been able to find a description of it in any botanical work. In Germany, where the greatest advantages have been derived from it, it is called *Dick Ruben*, (the Great Turnip); *Dick Wurzel*, (the Great Root); and *Mangel Wurzel*, (the Root of Scarcity). I have made use of the last denomination, *the Root of Scarcity*, (*Racine de Disette*) because it is a literal translation of the name often given to it by the Germans, and because it is expressive of the properties of the plant which it denotes. It might, indeed, be called *the Root of Abundance*, which would be no great deviation from the German name, and which would be expressive of one of the principal properties of this plant; which is, constantly to thrive, and to produce a very great crop, even when other kinds of roots and vegetables fail, and when there is a general scarcity of fodder.

This root ought not to be put into the class of turnips, nor into that of carrots; and
 although

although by its external appearance, and its feed, it very much resembles the beet-root ; it is superior to it in every respect, and appears to form a distinct species.* Its culture is

* I shall here urge some reasons, which appear to amount to certain proof, that the Root of Scarcity ought not to be confounded with the red beet root, nor with any kind of beets. If they do not strip off the leaves of the Root of Scarcity, it does not grow to any great size, or at least never arrives to the astonishing bulk in which we see it otherwise appear. If, on the contrary, they often strip off the leaves of the red beet, it hardly thrives any more, it is enervated, its vegetation becomes languishing, and its root hardens ; and besides, it scarcely ever happens, that the leaves of the red beat have the same taste with those of the Root of Scarcity, or grow with the same rapidity, or attain to the same length.

As to the white beet, this cannot be compared with the Root of Scarcity ; its leaves are curled, and have a very earthy taste ; its root is small, ill shaped, forked, hard as a horn, and useless.

If the Root of Scarcity were the same as the red beet, would the farmer sow so distinctly both the one and the other ? These two roots are equally known and cultivated in all the provinces of Germany ; but the produce

is so easy, its advantages so numerous, and it will answer so completely the purposes of
any

duce and the use of one being very different from those of the other, they only cultivate the Root of Scarcity in large quantities.

The red beet, in all the provinces of Germany, has a distinct name, and is called *Rothe Ruben* ; and they never give that name to the Root of Scarcity.

But it is of little consequence to what particular class of roots this belongs, whether to that of beets, or to any other ; that which is essential and incontestable is, that it unites in itself all the advantages which I attribute to it. I do not pretend to the merit of any invention, or to have communicated any new discovery ; I have no other design than to make known to the public my experiments and observations. If the root, concerning which I treat, is known in some parts of the kingdom, which is very possible, the people must be ignorant of the manner of cultivating it, and of its advantages, since it is not so multiplied as it ought to be.

It is undoubtedly by mistake, that some persons have given the name of *turnips* to the Root of Scarcity. *Monf. Buchoz* himself, in his work, entitled *An Economical Manual concerning Plants*, has confounded these

any other fodder, that it seems to me to deserve to be adopted every where, and to have the preference, even in the best years, over all other roots with which beasts are nourished. It may be planted in open fields, and in lanes; it will succeed in all lands, and especially in those that are moist and light. If in hard and clayey grounds it is prevented from making its way far into the earth, it will extend itself horizontally, and will produce above the surface that which the nature of the soil hinders from being produced beneath it.

This most valuable root is not affected by the vicissitude of the seasons, and has no destructive enemy; the insects and vermin, which make ravages on all other kinds of

two roots; since he says, that the leaves of English turnips resemble those of red beet, which is not true; for the English turnips are in reality only a species of turnips larger than others, of which the rough and deeply cut foliage is exactly like that of all others, and they are cultivated nearly in the same manner. Mr. Buchoz, therefore, has been deceived by a mistaken name; and what he has said relative to the cultivation of turnips, applies only to that of the Root of Scarcity.

vegetables, neither touch nor injure it. It is not attacked by blasting or mildew, and the greatest drought does not affect its vegetation; it does not injure the soil that nourishes it; but prepares it to receive, before the winter, the corn and other seeds which may be intended to be deposited in it.

In order to induce persons to engage in the cultivation of a root so valuable, and to cause it to succeed in all hands, I shall point out the time and the manner of sowing, transplanting, and cultivating it, and of gathering in the leaves; which succeed each other, without ceasing, in the greatest abundance, and which are highly useful, especially for horned cattle. I shall treat of the crop of roots, of the manner of preserving them, and of the method and time of re-planting them in order to obtain seed. I shall afterwards shew in what manner the roots are to be prepared for nourishing and fattening large cattle, and even for rearing young calves, that the owners are desirous of weaning soon after their

their being calved. I shall speak afterwards of the other advantages with which this root is attended. Lastly, I shall make some other observations relative to different subjects of agriculture, of the value and utility of which I have been convinced by experience.



A N
A C C O U N T
O F T H E
R O O T O F S C A R C I T Y, &c.

S E C T I O N I.

*The Time and Manner of sowing the Seed of the
Root of Scarcity.*

TH E seed of the Root of Scarcity may be sown as soon as the weather will permit the earth to be cultivated, from the end of February to the middle of April. This seed is sown in the same manner as that of other roots that are transplanted; that is, either at random, or in lines, at the distance of five inches from each other: they cover it with at least an inch of good earth. It is necessary that it should be somewhat thinly sown, because the root is large, because it will be easier to clear away the weeds, and because the plants will be finer and more vigorous. This seed is commonly sown in a garden, or in a piece of good land, well prepared.

§ II.

The Method of preparing the Earth into which the Roots are to be transplanted.

When the seed has been sown, the field must be prepared into which the roots are to be transplanted. It is with these roots as with all other plants, the more the earth is manured, the more thoroughly it is ploughed and prepared, the finer and larger they become; and the crop of leaves is proportionally increased and multiplied. In a middling kind of land the roots produced do not weigh more than four or five pounds, and they do not produce leaves above four or five times; in a good soil they weigh from nine to ten pounds, and put forth fresh leaves eight or nine times.

In 1784, I planted some, by way of experiment, in a very middling soil, and the finest did not weigh more than five pounds. In 1785, I caused them to be planted in a good corn field, but the land of which was
close

close and hard, and in which they made their way into the earth with some difficulty: they weighed, however, from seven to ten pounds. In a light, sandy, and rich soil, they grew still larger: some of them weighed fourteen, and even sixteen pounds.

O B S E R V A T I O N.

Although the most favourable season, for sowing the seed of the Root of Scarcity, is from the month of February to the middle of April, it is nevertheless advantageous to sow some every month, even till June; as by that means there will always be plants fit for transplanting: and wherever there is a void place, either in gardens, or in fields, there they may be planted. In 1784, the fly having four times destroyed the turnips that I had sown, I supplied their place with Roots of Scarcity; it was in the month of August, and I nevertheless gathered the leaves three times, and the roots weighed from three to four pounds. In hemp fields, after the crop of hemp has been gathered in,

the Roots of Scarcity may then be planted ; and this second produce, although of a very different nature from the first, will notwithstanding answer very well.

§ III.

The Time and Manner of transplanting the Root of Scarcity.

Towards the beginning of the month of May, the land being well broken up by the spade, or by the plough, and well prepared and levelled by the rake or the harrow, it is then proper to take a view of the plantation. If the roots are five or six inches in length, and if they are as large as a strong goose quill, they may be drawn out of the earth. None of their fibres should be cut off, but the leaves should be cut close at top, as is done with endive. Taking afterwards a planting-stick, make in the earth holes, from four inches and a half to five inches deep : these holes should be made in a right line, and chequer-wise, at the distance of eighteen

teen

teen inches from each other. A root should be put in every hole, placed in such a manner, that the tops may be seen a little way out of the earth. This is an easy precaution, but very essential, and without which they will never succeed well; these plants take root in twenty-four hours; and a man, who is a little accustomed to it, may plant 1800 or 2000 in a day.*

§ IV. *The*

* Many persons have found it difficult to procure seeds of the Root of Scarcity, from one end of the kingdom to the other, they have solicited me to render it easy to get them at Paris for the following year. I have been happy enough to prevail on M. de la Planche, a respectable apothecary, in the *Rue du Roule*, at Paris, to furnish his shop with a quantity of them, which I have procured for him. He sells them at four *livres* a pound; the prodigious quantity of these seeds that have been called for, having rendered them scarce and dear.

Those persons, who are desirous of having any for the following year, are requested to write to M. de la Planche in the month of November, in order to determine what quantity it will be necessary to provide. It is only towards that time that the price can be fixed, which varies according to the nature of the harvest. Persons sending orders are requested to send their ad-

§ IV.

The First Crop of Leaves, and Method of cultivating the Root.

At the end of June, or on the first days of July, when the outward leaves are become about a foot long, the first crop of leaves is to be gathered, breaking them off round and near the root. For this purpose, the thumb should be placed within, and at the origin of

dress; and it is also desired, that their letters be post-paid, and that they remit half the price of the seeds ordered, at the rate of four *livres* per pound. The other half is to be paid, on receiving the seeds ordered, in January, 1787. The seeds will be sent in that month, agreeably to the address communicated, and by the mode of conveyance that shall be directed.

Those persons, to whom, from their situation, it may be more convenient to apply to me to procure them these seeds, may send to me the same previous notice, and may depend upon receiving them at the same time. It is desired that, in both cases, the letters and the money may be sent free of expence.

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the leaves, in order to strip them off, close to their insertion into the stem. Those leaves only should be gathered which bend towards the earth, and care should always be taken to leave those of the heart of the plant: they will thereby be re-produced, and grow more quickly. Immediately after this first crop, the ground should be turned up once or twice with the mattock of the roots. In digging the earth this second time, the root should be raised high with a wooden spade, and the surface of the earth should be turned up afresh, so that every root should be cleared for an inch and a half, or two inches: they will then appear as if they were planted in a small basin, of nine or ten inches in diameter. Even a child might easily perform this operation. In light lands, it will be sufficient to clear away the weeds, and to dig up the earth with the spade. After this second operation, which is a very essential one, nothing more is necessary but to gather in the crop. It is from this moment that the roots begin to grow large, and to increase in an astonishing manner; and it is not advantageous to them to have other encroaching

vegetables for their neighbours: for both air and room are necessary, in order to give full effect to their inconceivable power of vegetation.

§ V.

The Produce of Leaves.

In a good land, the leaves may be plucked off these roots every twelve or fifteen days. I have remarked, more than once, that, in the space of twenty-four hours, their leaves increase from 25 to 30 lines in length, and from 18 to 20 in breadth; and also, that at the second crop, they have been from 28 to 30 inches in length, and from 20 to 22 in breadth. This account will appear exaggerated, till experience shall have demonstrated its truth.

§ VI. *Their*

§ VI.

Their Use for Cattle.

Oxen, cows, and sheep, readily eat these leaves; they nourish them, and they are even fattened by them. They are given to them entire, as they come from the field. Poultry will eat them, when cut small, and mixed with bran. Even horses will like these leaves very well, and may be fed with them during the winter. Nothing more is necessary for this purpose, but to cut them small, with such an instrument as I shall describe, when I come to speak more particularly of the roots. Hogs will eat these leaves very willingly.

MATERIAL OBSERVATIONS.

After repeated experiments, well established, and made under my own eyes, I may venture to assert, that milch cows, and which it is intended to continue as such, may, without

out the least inconvenience, eat of these leaves, for their whole nourishment, during eight, and even to fifteen following days. From the very first days, they will give a greater quantity of milk, and cream of the very best quality : but if they should be continued to be fed with this forage only, it would soon be apparent, that they fattened at a surprizing rate ; in a short time the milk will diminish, and the substance turn entirely to fat. These leaves produce the same effect on sheep and oxen ; from whence a judgment may be formed of the great facility with which they may be fattened, by this species of nourishment alone.

In order to keep milch cows in such a manner, as to cause them to continue to produce their full quantity of milk, it is necessary to mix with these leaves, from time to time, a third or a fourth part of that kind of grass or herbage, with which they have been generally nourished. This grass, or herbage, may be given to them once every day ; or one day in three they may be fed with it entirely. By this simple method only,
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the cows will always be rendered astonishingly productive, and their milk will be excellent. These observations refer only to those cows, who are constantly fed in stalls.

When there is an appearance of rain, or bad weather, a sufficient quantity of the leaves should be provided for two or three days; but it is necessary to turn up the heap into which they are formed, in order to prevent their being too warm. The repeated crops of these leaves do not give more trouble, than any other kinds of green forage, which it is necessary to mow, to reap, or to gather in fields or meadows, and which must equally be collected together, and conveyed into barns or stables. If there be any difference, it is in favour of the leaves of the Root of Scarcity; which a child may break off and gather, while it is necessary that men should be employed in mowing other kinds of forage.

When a quantity of this root is planted, proportioned to the number of cattle which are to be fed or fattened, we may be certain
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of being able to furnish them with leaves enough for the time they will be wanted, even during the greatest and the longest droughts ; in short, to the very time in which they may begin to eat the roots. I have endeavoured to reduce the leaves of the Root of Scarcity to dry forage, and I have succeeded ; but I would not advise any person to repeat the experiments that I have made for this purpose. The trouble of collecting and preparing them for dry forage, and the little advantage that they were productive of in this way, caused me to renounce the design of making this use of them. These soft and tender leaves are withered by the heat of the sun : it requires much time to dry them out of it ; the least rain, even the dew itself, rots and reduces them to nothing ; they disappear, as if they had been in an oven. The only method of succeeding then is, to pass a thread through the middle of every leaf, and to hang them to dry in the air ; but a cow would eat as many of these dried leaves in one day, as would nourish it for eight when they were green. This operation is also too long, too troublesome, and

too

too expensive, for the inhabitants of the country: but the great utility of the root itself will more than counterbalance this difficulty.

§ VII.

The Use of the Leaves for Men.

The leaves of this root will also afford to men an wholesome and agreeable food; they have not an earthy taste, like beets; their taste resembles that of the *Cardon d'Espagne*, and they may be eaten in the same manner. They may be dressed in different ways; they are considered as a kind of spinage, and are preferred to it by many persons; they may be eaten from the spring to the month of November; by their continual re-production, and great abundance, they are highly useful to farmers, to country people, and in all houses in which there are many servants. The roots, when dressed, they may eat themselves in the winter; and they may be dressed many ways. The Root of Scarcity is a very
good

good root, of an agreeable taste, much superior to the red beet, and at least equal to the turnip. The leaves which the roots, when kept in a cellar, produce during the winter, are very tender, and extremely delicate in side dishes.

§ VIII.

Crop of the Roots.

The commencement of sharp frosts determines the time for the crop of roots: in 1785, I began on the 14th of November; in 1784, I had been obliged to do it on the 15th of October. A fine day must be chosen for gathering in this very valuable crop, though at the hazard of doing it many days before it is necessary: it is important to the preservation of this root, that it should be kept perfectly dry. The day being fixed, these roots should be gathered in the morning, and left upon the place whereon they grew, that they may be dried by the air and by the sun. Children may follow those who
reap

reap the roots, and may closely cut off all the leaves. This operation may be performed the evening before, or even some days before the harvest. In the evening all the roots should be collected together; if they have been well aired, they may be put under cover in a cellar, or in any other dry place, where they are not in danger of being hurt by the frost; if there is no reason to be apprehensive of rain, they may be left in the field in which they were gathered during the night, and removed the next day to the place in which they are to be deposited. If the weather will permit them to be left in the air two or three days, it will be advantageous to them. They should not be handled roughly, either in removing them, or in discharging them into the cellar, or other place where they are to be kept; for as they have a very thin rind, they are easily bruised, and then they do not keep so well.

§ IX.

Of the Choice of those Roots which should be preserved for producing Seed.

The time of gathering in the crop is the season for choosing those roots which are proper for producing seed. Those which are only fit for this purpose, are those which have attained to a middling size, which are smooth, even, of a rose colour without, and white within side, or marbled with red and white: such are the marks which distinguish those which it is proper to preserve and cultivate. Those which are all white, or all red, are either degenerated, or are true beets, of which the seed, by the neglect of the cultivators, has been mixed with that of the Root of Scarcity. The roots, which are intended for the production of seed, should be kept separately from the others, in a place where they are secured from dampness and from frost.

§. X.

*The Time and Manner of re-planting those Roots,
which are intended to produce Seed.*

At the beginning of April, those roots ought to be put into the ground which are intended for seed ; they should be placed at the distance of three feet from each other ; as their stalks are from five to six feet in length, it is necessary to give them fences of seven feet in height, sunk a foot and a half into the earth ; these fences should be interwoven with small twigs, and should form a kind of hedge-row. Against this hedge-row the stalks should be tied, in proportion as they extend in length, that they may not be broken by the wind.

§ XI.

The Crop of Seed, and Manner of preserving it.

This seed commonly ripens towards the end of October ; it should be gathered im-

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mediately

mediately after the first white frosts appear ; then the stalks should be cut, and, if the weather will permit, they should be raised up against a wall, or palisade ; if the weather be bad, they may be tied together in handfuls, and hung up under shelter in an airy place, till they are well dried. The seed may be then taken, and preserved by being put into bags, as is done by other garden feeds.

Every root, when transplanted, may produce from ten to twelve ounces of seed.

§ XII.

The Manner of preventing the Roots from degenerating.

The seed of the Root of Scarcity degenerates, like all others, if care be not taken to change the soil every year, or at least every two years ; that is to say, to sow in a firm soil that which has been produced in a light and sandy soil, and in a light soil that which
has

has been produced in a firm and hard ground. Thus the cultivators of these two kinds of land, by every year changing their seeds, will afford to each a reciprocal benefit. This seed may be preserved in its full perfection for three or four years.

§ XIII.

The Means of preserving these Roots from the Month of November to the End of June.

If the stock of roots be considerable, and if they cannot be deposited in the house, it is necessary, many days before the crop, to cause ditches, or trenches, to be dug in the same field, or in some other place, which during the winter may be secured from rain; after having left the inside of these ditches to dry, during eight or ten days, you may put a little straw at the bottom, and at the sides; you may then place your roots, one by one, in these ditches, handling them gently, and taking the precaution of clearing them from all the earth which surrounds

them. You are then to cover the last roots with straw, and to throw upon that straw three feet of that earth which has been dug out of the ditches. You should beat this earth well, and form it into such a shape, with shelving sides, that the water may run from it the more easily.

§ XIV.

The Dimensions of the Ditches, or Trenches.

The dimensions of these ditches should be proportioned by the height of the ground, or to its declivity. They may be made from two to four feet in depth ; their length is indifferent, and depends upon the quantity of roots to be deposited in them ; their breadth is generally about three feet and a half.

As these roots have the very beneficial property of keeping without alteration to the month of June, it will be advantageous to multiply the ditches, and to make one for every

every month's consumption, beginning with the month of March, that being the time about which there is generally an end to the stores of provision collected from winter consumption. I recommend multiplying the ditches, because that these roots, when they are exposed to much air, after having been long deprived of it, will not keep for a long time fresh ; and this inconvenience may be prevented by multiplying the number of ditches.

§ XV.

The Necessity and Manner of making a Vent.

It is absolutely necessary that every ditch should have a vent, by which the fermentation of the roots may be exhaled : without this precaution, all that you attempt to preserve under-ground, will be rotted or spoiled. I will point out the manner in which this vent should be made. Before any thing is put into the ditch, you should set up in the middle of it a small pole, of six or seven

feet in length, and two inches in diameter ; then place your roots in the ditch, and dispose them in such a manner as to make a sloping heap, raised in the middle, with shelving sides ; when the ditch is full, and the roots are raised in the middle, half a foot above the level of the earth, you should twist round the pole a rope of hay of about an inch in thickness, taking the precaution not to bind it too hard ; you should then throw the earth over it, placing it, and beating it down, in the manner that has been before mentioned. When the ditch is well covered in, and finished in the form of a coffin, you may then pull out the pole, the hay will remain in the hole, and the exhalations, which the roots throw out in fermentation, will evaporate through that passage. At the end of a few days, you should cover this hole with a bit of hollow tile, and when the severe frosts come, you should stop it up with a flat stone.

§ XVI.

The Manner of preparing the Roots for the Nourishment of Cattle.

In order to cause these roots to be eaten by all kinds of cattle, it is necessary to cut them into small pieces, after having well washed and cleansed them. We employ for this purpose a sharp instrument, made of a blade of iron a foot long, and two inches broad, and twisted into the form of an S; in the middle of the two branches of the S is foldered a socket of about two inches long; in this socket is fixed a wooden handle of about three feet six inches in length; with this instrument, which, at first view, appears intended to imprint the letter S upon any body, they cut these roots with as much regularity as facility. This operation is performed in a tub or trough intended only for this purpose. A man may in one hour's time cut into small

pieces a quantity of roots, sufficient for the nourishment of twelve oxen for a day. Before the roots are cast into the trough, it is necessary to split them, and cut them into quarters. It is advantageous to mince these roots into small pieces, of the size of a nut. I have remarked, that when this is done, cattle thrive better with them,

§ XVII.

For Horned Cattle.

Prepared in this manner, these roots may be given, without any mixture, to any horned cattle, and to sheep, especially to those that are to be fattened; but if it be necessary to husband the roots, there may be mixed with them a quart or more of hay and of chopt straw; it is even advantageous to observe this method, during the three or four first weeks, with the lean cattle that are intended to be fattened: the hay of trefoil, of lucerne, and sainfoin, &c. is the best for this purpose.

Those

Those persons who have, or who will procure, an instrument for cutting dry fodder, similar to that which is successfully and advantageously made use of in Germany, will save much time, and waste less of their provisions.

§ XVIII.

For Horses.

During all the winter horses may be fed with this root, adding, however, half straw and hay, cut and mixed together. Being thus fed, they will become fat, strong, and sleek; but when they are hard worked, it will be necessary to add from time to time a few oats. This is the practice in those provinces of Germany, in which this root almost supplies the place of meadows, and of which the breed of horses is well known, and esteemed.

Hogs will also readily eat these roots when cut small, raw, and mixed with the fat or milky

milky drink, which is generally given them. They will become as fat by eating these roots, as other swine will by different kinds of food, which are obtained with more expense and trouble.

§ XIX.

Of the Quality of these Roots, to be given to different Kinds of Cattle.

The quantity of these roots, that should be given in a day to eat to different kinds of beasts, should be regulated by that of the dry fodder that is given them, and which, indeed, ought always to be added (for it is necessary every day to give them a little before they are made to drink); and this quantity ought also to be proportioned to the size and condition of the beasts. Regard is also to be had to the views of the owners respecting the beasts: those that are fed in order to be kept, should eat less than those which are intended to be fattened for sale. As the size of these roots is different, according

cording to the goodness of the soil which produces them, we cannot fix the quantity by the number of roots, nor can we ascertain the quantity to be given to every beast by weighing the roots; many persons would neither have time nor conveniencies for weighing them; and I shall content myself with relating the following facts, which will throw upon this subject all the light of which it is susceptible.

In the month of May, 1785, I planted sixteen thousand and some hundreds of these roots, in a field containing two acres and an eighth, Heidelburgh measure: this measure is the same, as I am assured, as that of Lorrain; the acre containing 250 roods, the rood ten feet, and the foot ten royal inches. From the beginning of July, till the 15th of November, seven cows and three calves were constantly fed from the produce of the leaves, mixed with a third or fourth of other herbage, as I have before mentioned; and from the 20th of November they eat the roots cut small, in the manner that I have already pointed out. The cows had two
meals

meals a day, each consisting of sixteen or eighteen pounds of roots, mixed with four pounds of chopt straw or hay : with this nourishment their milk was as good, and as plentiful as it had ever been, and they were in the best condition possible.

§ XX.

The Method of fattening Oxen.

I fattened four very lean oxen ; and gave at first to each, twice a day, twenty pounds of these roots, mixed with five pounds of after grass, or of chopt hay. At the expiration of a month, in consequence of instruction that I had received from an intelligent and observant farmer, I caused their chopt hay to be omitted, and substituted five pounds of roots in its room. Thus they lived, for two months, upon roots only ; and at the end of three months, they were sufficiently fat for sale. They always readily devoured this food, because it is well-tasted, tender, and requires no preparation.

paration. I have remarked, that it is advantageous to give to oxen, as well as to cows, their day's allowance, at two or three times; they will thereby fatten sooner, and there will be nothing spoiled or lost, as often happens, when their day's allowance is given all at once.

From this recital, which is exact and faithful, it will be easy to conclude what quantity of roots are necessary for nourishing a cow, and fattening an ox; how much an acre of land may produce, when the roots are planted at eighteen inches distant, agreeably to what I have already said; and how many oxen may be fattened, or cows kept, with the produce of an acre.

Four months are commonly requisite for fattening an ox, with the provisions that it is usual to make them eat. Now these roots will keep eight months in the year; and the leaves, which answer the same purpose, will furnish nourishment for the four other months; the cattle then to be fattened with these roots may be renewed three times in the year; or
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those whom it is proposed to keep, may be fed constantly with them, during the whole course of the year.

§ XXI.

The nett Produce of an ACRE of Land, Lorrain Measure.

In order to save cultivators some trouble, in calculating what quantity of roots may be produced in an acre of land, Lorrain measure, which is nearly equal to half an acre of France, I will state here the method of proceeding in that calculation, and of shewing the result. The acre of land contains 250 square roods, the rood contains ten feet, and the foot ten royal inches: the *arpent* then comprehends 2,500,000 square inches of surface; but every square of 18 inches contains (multiplying 18 by 18) 324 square inches; and thus, in dividing 2,500,000, by the number of square inches necessary to every root, it will be found, that 7,716 roots may be planted in an acre of Lorrain, placing them

them at 18 inches distance : there remains, indeed, a fraction in this calculation ; but this may be disregarded.

As to the weight of the roots, as that depends upon the goodness and nature of the soil wherein they are planted, it must consequently depend upon the choice made of the land. But it may here be observed, that if the land be but middling, and little dunged, these roots may be planted a foot, or fifteen inches distance from each other ; but, in a good soil, eighteen inches should always be allowed.

Many of the inhabitants of Puttelange, and all the farmers who have imitated me, have succeeded as I have done ; but those who have not conformed to my directions relative to the plantation and culture, those who have sunk their plants too deeply into the earth, those who have set them too near to each other, or who have mixed them with other kinds of roots, and who have not attended properly to their cultivation, have not succeeded : they would undoubtedly

undoubtedly have attributed to the nature of the root, and to the soil, that want of success which was the effect of their negligence, if many of their neighbours had not succeeded.

If in every province some person could be found sufficiently benevolent to sow a large quantity of the seed of the Root of Scarcity, and to distribute the plants to all those who should be desirous of cultivating them; if some one should also condescend to teach, at the same time, the methods of planting, cultivating, and using them, he would certainly render a very important service to the inhabitants of the country, to those who cannot derive information from the Memoirs which are published by government, or by the learned; because they are neither acquainted with them, nor understand them; and are ignorant even of the existence of those periodical publications, which frequently announce useful discoveries, and interesting inventions. The inhabitants of the country continue in a state of ignorance, only because pains is not taken to communicate instruction to them; they

they live in a state of apathy, only because the proper measures are not adopted for awakening their industry, and exciting their ardour.

The keeping a cow will greatly contribute to the felicity of the family of the labourer and the mechanic, &c. He who has not hitherto been able to do this, because he has not been able to feed one, may easily in future enjoy this advantage; let him rent but a little spot of ground, and there cultivate the Root of Scarcity, and he may keep his cow; and the milk which she will produce, in less than a month, will pay the rent of his ground. The peasant, who has hitherto been able to keep but one cow, will be enabled to keep two or three, if he will apply himself to the cultivation of the same root.

§ XXII.

Farther Advantages resulting from the Cultivation of the Root of Scarcity.

Besides the advantages which I have already enumerated, the Root of Scarcity also possesses many others; and I shall here particularly mention the certainty of an abundant crop, however intemperate may be the seasons.

If this Root be cultivated, it will not be necessary that cattle should pasture in the meadows, and eat the produce of them during the summer; but all the grass which the meadows produce, may then be converted into hay. How much, indeed, may they not sell of it, since, even during the winter, they may at least save two-thirds of it? And, in short, as the Root of Scarcity will render it easy to feed beasts in the stable during the whole year, this circumstance will also
greatly

greatly increase the quantity of dung, which is so necessary in agriculture.

In consequence of these advantages, forage may always be kept at a moderate price; for this root yields a much greater produce than other kinds of forage, and surpasses them even in those years in which they are the most favourable. When this root is become sufficiently known, cultivators will undoubtedly prefer it to all the other kinds of forage.

The numerous experiments that I have made, especially in the year 1785, relative to the culture, the produce, and the use of the Root of Scarcity, have convinced me, that it deserves to obtain a decided preference over all other roots, and even over turnips. Whether I am partial, or enthusiastick in my attachment to it, may be determined by considering the reasons which I am now about to enumerate.

§ XXIII.

Recapitulation.

1. This kind of Root may be eaten by men during the whole year : it is agreeable and wholesome, and does not cause flatulencies, as turnips do.

2. As the Root of Scarcity is not attacked by the caterpillar, or by any other insect, its success is certain every where : it suffers nothing from the vicissitude of the seasons. Neither our own turnips, nor those of England, possess these advantages.

3. The leaves of the Root of Scarcity afford an excellent food for all kinds of cattle, during four months in the year ; whilst turnips produce leaves only once a year, and even then are tough, and injured by insects.

4. The Root of Scarcity may be well preserved during eight months in the year, and
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are not subject to become rotten, as is the case with turnips; which, from the end of the month of March, become stringy, tough, and spungy.

5. There is no kind of turnips which ever succeeds perfectly; they often fail entirely, especially in hard lands; they require a light, good, and sandy soil; but the Root of Scarcity will succeed every where; the cultivators of different kinds of lands may be equally assured of success; and farmers and labourers may be greatly benefited by this resource.

6. The milk produced by cows who have been nourished for some days together with turnips, contracts a taste like tallow, or strong, sour, and disagreeable; but those, who are fed with the Root of Scarcity, produce both milk and butter of an excellent quality.

After this parallel, which I have made with an exact regard to truth, and which will undoubtedly be verified by all those for whom I have procured the seed of the Root of Scarcity, it will no more, I hope, be con-

founded with turnips; not even with that large species of them, which has been long known and cultivated in Germany, but which now is generally neglected, on account of the inconveniencies that I have pointed out.

This excellent forage will afford subsistence to all kinds of cattle, and especially at that time when grass, so useful and necessary to cattle, is yet scarce; and it will be seen, by their vigour and their sleekness, how much it has contributed to their health.

The Root of Scarcity is never disliked by cattle; they eat it always with the same avidity, and the same pleasure; and they have nothing to fear from those unhappy accidents, which sometimes result from the use of turnips. How much is it to be wished that these united advantages, which are founded upon constant experience, may destroy that distrust, and those prejudices, which this new Root may, perhaps, at first inspire among the French; for it is only in some provinces of Germany, in which it is cultivated with
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the greatest success, that the preference is given to it over every other kind of fodder, and in which it is employed for fattening the greater part of those herds of cattle, which are every year brought for sale into this kingdom.

I shall esteem myself happy, if the truths which I have stated should encourage the cultivation of a root, which may increase the riches of the state, and contribute to the ease, and to the happiness of the people.

§ XXIV.

Of the Manner of bringing up Calves, by weaning them at twelve Days old.

The scarcity of fodder having obliged farmers to kill many cows, and having hindered them, for two or three years, from bringing up the number of calves that they have generally been used to do, the price of provisions, of butter, and of milk, has been increased in such a manner as was never before

known. In order to stop the progress of this advance in the price of provisions, which seems as if it would become still more considerable, it is necessary to encourage country farmers to apply themselves still more than ever to the breeding of horned cattle; the Root of Scarcity will furnish them with the means, and will destroy the pretext commonly employed by farmers, that they cannot deprive themselves of the milk of their cows, which is so necessary for their own subsistence, and that of their families. By making use of the Root of Scarcity, they may, with a little care and trouble, wean, at ten or twelve days old, those calves that they are desirous to rear.

From the third day, it is necessary, once a day, to give to calves newly calved a little milk lukewarm, in a wooden bowl; whether they drink it, or not, is of little consequence; it will be sufficient, if they moisten their lips with it. They will drink it willingly when they are eight or ten days old; and from that time they should no more be suffered to approach their dam: they should
then

then give them to drink, morning and evening, during three or four days, milk from the cow; and at noon, instead of milk, some warm water, in which a little flour is mixt, should be given them. From the time they are twelve days old, no more milk unmixt should be given them, either morning or evening; but only water, lukewarm, mixed with flour and a little milk: this regimen should be continued during four or five days, after which they should be fed in the manner following.

From the fourth day, a little bran, in the palm of the hand, should be offered from time to time to the calf; when it begins to lick the bran, a small quantity of it should be laid before him, and a handful of hay; and this should be continued till the twelfth day, the time in which he will have learned to eat. It is necessary to take care, that the place in which this food is put should be very clean, and that it be swept every time fresh food is given. After the expiration of twelve days, there should be given him, every day, three times a day,

leaves

leaves of the Root of Scarcity, cut small, and mixed with one third hay; and twice a day he should have clean water given him to drink. If it be winter, the root itself will supply the place of the leaves. When the calf is four or five weeks old, the bran may be omitted, and it may be fed with straw and hay cut small, and mixed in equal quantities with the roots or with the leaves. It will be necessary every time to take away all that the calf shall have left, and to give him his provision quite fresh, that he may not be disgusted with it. The calves, who are brought up in this manner, will graze when they are six weeks old, and will succeed very well, as I have proved by experience.

§ XXV.

Of the Culture of Carrots, in those Fields in which Barley has been sown.

To the preceding observations concerning the Root of Scarcity, I think it also proper to add those that I have made relative to
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some other objects of agriculture, little known, or little practised, in Lorrain, and in the bishopricks; and which may, notwithstanding, be useful to the inhabitants of the country, in good as well as in bad years.

In all good lands, but especially light and a little moist, which are designed for the production of barley, a double crop may always be obtained. When the barley is sown, and buried under-ground by the plough, or by the harrow, the seeds of carrots may be lightly strowed over the field, and the roller may be passed twice over it, which will be sufficient to bury the seed under-ground. As the barley will not hinder the carrots from thriving, a rich crop may be gathered in the month of November. If there is time to clear and to weed the carrots, they will be the finer. No one can be ignorant, that carrots are an excellent food both for men and for beasts. Many persons are accustomed to cut the leaves of carrots at different times; but I have observed, that this operation hardens them, and tends to impede their vegetation.

§ XXVI.

Of the Culture of Spurrey, and its Advantages.

The *spergula*, or spurrey, is a plant which may be made use of in the year in which it is sown, and which re-produces itself by its seed, and not by its root. The cultivation and the use of this root are so totally unknown in this province, that even its name is hardly known. This kind of fodder is, however, extremely advantageous, and is so productive, and so quick in its growth, that it may almost be procured in the moment of need; and in light lands, neither plough nor horses are requisite for its cultivation. After the crop of corn, may be sown four or five pounds of this seed upon the stubble in an *arpent* * of land; and the earth must be swept three or four times with a bundle of thorns. In about five or six weeks there will be found in this field an abundant pasture for horses, oxen, cows, and sheep. The cows which are fed with

* An *arpent* is a measure of land, containing 100 perches square, of 10 feet each.

this fodder, give a great abundance of milk of the very best sort; and the butter that they produce is the best that can be for keeping. In Brabant and in Holland, where this kind of fodder is the most cultivated, the butter that is produced by the cows which are fed with it, is so much esteemed for its goodness and its firmness, that those vessels, which are intended for long voyages, are particularly provided with it; and it goes by the name of *spurrey butter*.

When they take the advantage of a day of rain in order to sow the spurrey seed, it springs up from the fourth day. In hard lands, it is necessary, before sowing the seed, to pass an iron harrow over the stubble; and, after the seed has been sown, to make use of a bundle of thorns. The seed of this forage may be procured from the cornfactors, or may be sent for from Antwerp.

In order to naturalize spurrey in our country, it is necessary to sow it in the month of April, and to reap it in the month of August. The hay that it produces, although of a disagreeable smell and colour, is eaten with avidity

dity by horses, oxen, cows, and sheep. They prefer it even to the best hay, and it is extremely nourishing. All poultry, and especially pigeons, will eat this kind of seed, in preference to any other.

§ XXVII.

A Method of procuring a Supply, in case of a Scarcity of Hay.

It appears from experience, that when the months of April or May are dry, and there is much violent wind, the harvest of hay is far from being abundant. In order to procure, at such times, a supply of fodder, it is requisite that prudent and vigilant farmers should then cultivate a part of their fallow lands; and they should sow rice, barley, and oats, mixed with vetches and lentiles. At the beginning of August, when the rice begins to grow to an ear, they mow and make hay of the stalks of these plants, and thereby supply the deficiency of hay from the meadows; and the fields which have produced this hay will again furnish the same kind of pasture. This seed-time may be the better attended

attended to by husbandmen, as their principal labours will then be suspended.

§ XXVIII.

A new Method of making Hay, from the Produce of artificial Meadows.

In this province they are happily in the custom of sowing much trefoil, lucerne, sainfoin, &c. but as few persons are acquainted with the proper method of reducing these plants into dry fodder, almost every body destroys the leaves and the flowers, which are the best part, and leave only the stalks. I shall, therefore, point out the manner of avoiding these inconveniencies.

It is necessary that stakes should be provided of eight or nine feet in length, about the thickness of a man's arm; the quality of the wood is indifferent. In these upright stakes, holes should be pierced on all sides, fifteen inches one from the other; and through these holes sticks should be put of an inch and a half in diameter, and about four feet in length. These stakes should be driven
into

into the earth, at equal distances, in the field which they are about to mow. They are not unlike the perches that are made for parrots, or for turkies.

The grafs should be mowed when it is in full flower, and taken up by armfuls, as it falls under the fcythe, and laid upon these ftakes and twigs. There it should be left without being turned or touched, till it is quite dry, and then it may be removed into the hay-loft; and by this method neither the feeds nor the leaves of the plants will be loft. Bad weather will not hurt hay which has been thus managed; rain will not continue upon it, and the air will dry it more readily and more equally than upon the earth. Spurrey, which is a very thick grafs, may be made into dry fodder in the fame manner. The crop of hay being gathered in, the ftakes may be taken out of the ground; and, if preserved with care, they may be used for the ame purpose many years fucceffively.

The repeated experiments which have been made on the Root of Scarcity, in all the provinces

vinces of France, having been crowned with the greatest success, the Abbe de Commerell hopes to be of service to farmers, by communicating to them the following new, and more simple and easy method of managing this root, which he practised with great advantage during the last year.

In the months of March and April, the land being well prepared, manured, and made light, the largest and soundest Root of Scarcity seed must be chosen, steeped in water for twenty-four hours, and then dried a little, so that they may be handled.

Lay the line upon the field, as if you were to plant the roots at the distance of nineteen inches on each side; make, with the finger, holes one inch deep, in each of which put *one grain only*, which is to be immediately covered with the earth. After ten or twelve days it will shoot, and every grain will have four, five, or six roots growing together. As soon as these small roots shew their fourth leaf, the feeblest of them must be carefully plucked off, and the finest and most vigorous

root only left. In a little time the growth of the roots thus selected will be astonishing; not one will fail. After this manner, equally simple and easy, the transplanting of the roots is avoided, and leaves obtained four or five weeks sooner; the roots grow finer and larger, and deepen better; and, in a light land, much labour is saved.

As the roots naturally grow a little above the ground, notice those which do not so appear, and bare them by removing the earth from around their top, as before observed in § III. Sow the remains of the seed at random, that you may transplant the roots where you please. If you chuse to leave these in the same place, they must be thinned and dug round early: but this is very troublesome, and the roots planted thus, never grow so large as those whose seed has been set. Experience has proved this difference.

Those persons who wish to have further information concerning the culture of the Scarcity-Plant, may apply to the Abbe de Commerell, in the Abbaye de S. Victor, at
Paris.

Paris. At the request of many people, he has caused knives, as described in his treatise, to be made under his own inspection, which are sold by M. De la Planche, Apothecary, rue du Roule à Paris, who is the only vender of the seed of the true Scarcity-Root.

F I N I S.



